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### RESEARCH ARTICLE

#### HISTOPATHOLOGICAL STUDY OF PIGMENTED LESIONS OF SKIN

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##### Key words:-

Pigmented Skin Lesions, Patch, Leprosy, Nevus

#### Abstract

**Objectives:** The purpose of this study is : To study the relative incidence, site, distribution and characteristics of various disorders causing pigmentary lesions.

**Study Design:** Prospective observational study.

**Setting:** Histopathology Department, B.J Medical College, Civil Hospital Ahmedabad.

**Period:** Consecutive cases with clinical diagnosis of pigmented skin lesion, period between August 2020 to September 2022.

**Method:** In this study, all the specimens were incisional biopsies of skin, fixed in 10% formalin, embedded in paraffin, and stained with Hematoxylin and Eosin stains.

**Result:** On analyzing 284 consecutive pigmented skin lesions starting from the year 2020, it was found that the large majority of these lesions were benign. The most common pigmented skin lesion was melanocytic nevus. Pigmentary lesions include both hyperpigmented and hypopigmented lesions. Out of 284 of biopsies of skin 176 biopsies were hypopigmented lesions and 108 biopsies were hyperpigmented lesions.

**Conclusion:** In conclusion, most of the pigmented skin lesions are benign, encountered between the age group of 30-40 years and commonly affect the head and neck followed by all over the body. Patch forms the most common type of lesion. In hypopigmented lesions Leprosy and in hyperpigmented lesions Nevus was the most common lesion.

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#### Introduction:-

Pigmented skin lesions are encountered in Dermatology and Plastic Surgery Clinics. Patients seek consultation primarily for cosmetic reasons or when they are scared of any possible malignancy developing in an enlarging pigmented skin lesion.

The skin is the largest organ of the body, accounting for about 15% of the total body weight in adult humans. Skin exerts multiple vital protective functions against environmental aggressions, rendered possible thanks to an elaborate structure, associating various tissues of ectodermal and mesodermal origin, arranged in three layers, including (from top to bottom) the epidermis (and its appendages), the dermis and the hypodermis.

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Disorders of pigmentation can result from migration abnormalities of melanocytes from neural crest to the skin during embryogenesis, impairment of melanosome transfer to keratinocytes and alteration in melanin synthesis. Pigmentary lesions include both hyperpigmented and hypopigmented lesions.

Evidence for a correct diagnosis is often lacking without histopathologic examination of skin biopsies. It is well known that the histologic diagnosis of inflammatory and other skin diseases requires clinicopathologic correlation and there is evolution of skin lesions into different stages as the disease progresses. Pathologic examination often serves as a complementary or a confirmative part of the diagnosis. The histology-based treatment principles may be helpful for establishing a standardized treatment algorithm for pigmentary skin lesions.

### Method:-

The Present Study was a prospective observational study carried out in Histopathology Department, B.J Medical College, and Civil Hospital Ahmedabad. The Study was carried out during the period between August 2020 to September 2022. All specimens of patients having Pigmentary lesions of skin are included in this study. All the cases had incisional skin biopsy, fixed in 10% formalin, embedded in paraffin, and thin sections were stained with Hematoxylin and Eosin stains. The slides and diagnoses of all the cases were reviewed and all the data analyzed according to diagnosis, age, and affected body site.

### Result:-

Total 284 cases of pigmentary skin lesions were received at histopathology department, B.J Medical College, Civil Hospital Ahmedabad during the period of August 2020 to September 2022. These lesions constituted 1.2% of total surgical pathology load of the department and 33.9% of total number of skin biopsies at our institute in two years of study. Pigmentary lesions include both hyperpigmented and hypopigmented lesions. It was found that out of 284 of biopsies of skin 176 biopsies were hypopigmented lesions and 108 biopsies were hyperpigmented lesions.

Hypopigmented lesions (176 cases) include Melanopenic (175 cases) and Melanocytopenic (1 case) lesions. Melanopenic lesions include mainly leprosy, pityriasis lichenoid chronica, lichen sclerosus at atrophicus, pityriasis versicolor and post inflammatory hypopigmentation. Melanocytopenic lesion was vitiligo.

Hyperpigmented lesions include melanocytic (42 cases), melanotic (40 cases) and Non Melanin hyperpigmented lesions (26 cases). Melanotic hyperpigmented lesions include morphea, post inflammatory hyperpigmentation, Dowling degos disease, lichen simplex chronicus, discoid lupus erythematosus, prurigo simplex. Melanocytic hyperpigmented lesions include nevus, lichen planus pigmentosus, malignant melanoma, lentigo. Non melanotic hyperpigmentation lesions include basal cell carcinoma, cavernous hemangioma, lobular capillary hemangioma, seborrheic keratosis, bowenoid papulosis, keratoacanthoma, dermatofibrosarcoma protuberance.

**Table I:-** Classification Of The Lesions.

| Type of lesion         | Non neoplastic       | Neoplastic |            |           | No. of cases | %     |
|------------------------|----------------------|------------|------------|-----------|--------------|-------|
|                        |                      | Benign     | Borderline | Malignant |              |       |
| <b>Hypopigmented</b>   | 176                  | 0          | 0          | 0         | 176          | 61.9  |
| <b>Hyper pigmented</b> | <b>Melanocytic</b>   | 40         | 0          | 0         | 42           | 14.78 |
|                        | <b>Melanotic</b>     | 26         | 8          | 0         | 40           | 14.08 |
|                        | <b>Non Melanotic</b> | 3          | 19         | 2         | 3            | 9.15  |

|              |     |    |   |    |     |     |
|--------------|-----|----|---|----|-----|-----|
| <b>Total</b> | 244 | 27 | 2 | 11 | 284 | 100 |
|--------------|-----|----|---|----|-----|-----|

Among the total cases studied, 244 cases were non neoplastic, whereas 41 cases were neoplastic.

**Table II:-** Frequency Of The Pigmentary Lesions.

| Sr. No. | Pigmentary Lesions                           | No. of cases |              | Percentage (%) |
|---------|--|--------------|--------------|----------------|
|         | <b>Hypopigmentary Lesions</b>                | <b>176</b>   |              | <b>61.97</b>   |
| 1       | Leprosy                                      | 149          |              | 52.5           |
| 2       | Pityriasis Lichenoides chronica              | 10           |              | 3.5            |
| 3       | Lichen sclerosus et Atrophicus               | 6            |              | 2.1            |
| 4       | Pityriasis versicolor                        | 5            |              | 1.76           |
| 5       | Post inflammatory hypopigmentation           | 4            |              | 1.4            |
| 6       | Vitiligo                                     | 1            |              | 0.35           |
| 7       | Parapsoriasis                                | 1            |              | 0.35           |
|         | <b>Melanocytic Hyperpigmentary Lesions</b>   | <b>42</b>    |              | <b>14.78</b>   |
| 8       | Nevus  | 23           |              | 8.1            |
| 9       | Lichen planus pigmentosus                    | 16           |              | 5.63           |
| 10      | Malignant melanoma                           | 2            |              | 0.7            |
| 11      | lentigo                                      | 1            |              | 0.35           |
|         | <b>Melanotic Hyperpigmentary Lesions</b>     | <b>40</b>    | <b>14.08</b> |                |
| 12      | Morphea                                      | 12           | 4.2          |                |
| 13      | Seborrheic keratosis<br>Pigmented type       | 8            | 2.8          |                |
| 14      | Basal cell Carcinoma                         | 6            | 2.1          |                |
| 15      | Post inflammatory hyperpigmentation          | 7            | 2.46         |                |
| 16      | Dowling degos disease                        | 3            | 1.1          |                |
| 17      | Discoid lupus erythematosus                  | 2            | 0.7          |                |
| 18      | Lichen simplex chronicus                     | 2            | 0.7          |                |
|         | <b>Non Melanotic Hyperpigmentary Lesions</b> | <b>26</b>    | <b>9.15</b>  |                |
| 19      | Cavernous hemangioma                         | 9            | 3.2          |                |
| 20      | Bowenoid papulosis                           | 7            | 2.5          |                |
| 21      | Lobular capillary hemangioma                 | 3            | 1.1          |                |
| 22      | Keratoacanthoma                              | 3            | 1.1          |                |
| 23      | Dermatofibrosarcoma Protuberans              | 2            | 0.7          |                |
| 24      | Prurigo simplex                              | 1            | 0.35         |                |
| 25      | Purpura                                      | 1            | 0.35         |                |
|         | <b>Total</b>                                 | <b>284</b>   | <b>100</b>   |                |

**Leprosy (52.5%)** was the most common diagnosis in this study. Leprosy is caused by mycobacterium leprae, which was discovered in 1873. In 2008 mycobacterium lepromatosis, a new causative agent was discovered causing diffuse lepromatous leprosy which has 9.1% genetic difference indicating a different species. Based on these clinical signs, histology and immune response, Hansen's disease was classified by **RIDLEY - JOPLINGS into five groups.**<sup>(1)</sup> They form a disease spectrum.

They are

1. Tuberculoid
2. Borderline tuberculoid
3. Borderline
4. Borderline lepromatous
5. Lepromatous.

- Of 52.5% cases of leprosy, 29.5 % cases were tuberculoid leprosy followed by 25.5 % were lepromatous leprosy.

- Of the 149 cases 44 cases were diagnosed as tuberculoid leprosy as they had well formed granulomas composed of epithelioid cells.
- 38 cases were given the impression of lepromatous leprosy. Extensive inflammatory infiltrate composed mainly of lymphocytes and foamy histiocytes were found in the dermis separating it from the flattened epidermis. The Grenz zone was clearly made out. Destruction of cutaneous appendages was observed. There was absence of granulomas which distinguished from Tuberculoid type (TT).
- 17 cases were diagnosed as borderline lepromatous type as they had predominant lymphocytes and few macrophages and ill defined granulomas.
- 11 cases were diagnosed as early indeterminate type as there was only mild lymphocytic infiltration in the periadnexal region and absence of granulomas. Focal lymphocyte infiltration was seen in lower dermis.
- 11 cases presented as Erythema Nodosum Leprosum reaction shows macrophages with vacuoles and globi and a polymorphonuclear cell infiltrate.
- 17 cases were diagnosed as borderline lepromatous type, 11 cases were diagnosed as early indeterminate type, 11 cases presented as Erythema Nodosum Leprosum reaction, 11 cases presented as Histoid leprosy, 8 cases diagnosed as borderline type, 7 cases were diagnosed as borderline tuberculoid type. 2 cases presented clinically with painful plaques with mild edema along with hypopigmented lesions. This was diagnosed as lepra reaction type I.

**Nevus (8.2%)** was found to be more common in females with a male-to-female ratio of 1:1.3. Out of the total 23 study cases, 10 were male and 13 were female. Of the 23 cases, the most common age distribution was at below 20 years.

- Melanocytic nevi are characterized clinically by flat- to dome shaped, flesh- to dark brown colored, and solitary- to multiple skin lesions.<sup>(2)</sup> There are two commonest histologic subtypes of melanocytic nevi, i.e. intradermal and compound melanocytic nevi. The intradermal melanocytic nevi are histologically characterized by symmetrical proliferation of melanocytes in the upper and mid dermis with downward maturation; while, compound melanocytic nevi show, in addition, junctional melanocytic activity. Melanocytic nevi are hamartomas/benign neoplasms showing mutations in BRAF and NRAS genes, it is also the same gene that is affected in malignant melanomas.<sup>(3)</sup>

**Morphea (4.2%)** are limited to the skin and to the subcutaneous tissue beneath the cutaneous lesions. Predominantly on the extremities and on the anterior scalp.

Histopathology Early inflammatory, intermediate, and late sclerotic stages exist.

- Overall, pigmented skin lesions were more common in the 2nd, 3rd, and 4th decades of life with peak in the 3rd decade. 69 cases were observed in this age group with 39 cases were males and 30 cases were female.
- Of the 284 cases, the most common site involved head and neck followed by all over the body. Hansen's disease showed involvement of multiple sites.
- Patch forms the most common type of lesion among the 284 pigmentary lesions which present in 91 cases and form 32% of all lesions.
- All 181 cases of multiple lesions were seen in non neoplastic cases.
- Out of 103 cases of single lesion, 63 cases were seen in non neoplastic cases, 27 cases were seen in benign lesions, 11 lesions in malignant cases and 2 lesions in borderline cases of dermatofibrosarcoma protuberans.

### Discussion:-

The skin comprises of epidermis, dermis (containing skin adnexal structures), and subcutaneous tissue. Epidermis is composed mostly of keratinocytes (90%-95%) while melanocytes, Langerhans cells, and Merkel cells constitute the rest of the cells (5%-10%). Melanocytes are derived from neural crest and are located at the basal layer in ratio of one melanocyte for every four- to ten basal keratinocytes (1:4-10).

Melanocytes are smaller than the surrounding basal keratinocytes, have ovoid nuclei with perinuclear halo, and dendritic cytoplasmic processes. They produce melanin that protects against injurious UV light.<sup>(4)</sup> Melanin pigment is usually present in nevocellular nevi and malignant melanoma, but also in other non-nevoid skin tumors like seborrheic keratosis, basal cell carcinoma, some squamous cell carcinomas, schwannoma, dermatofibrosarcoma protuberans, etc.<sup>(5)</sup>

Pigmented skin lesions are common in all groups and more so, in fair-colored individuals. It is interesting to note that the number of melanocytes is the same in fair-colored and dark-colored skins and the skin color depends on the number, size, and distribution of melanosomes in the epidermis.<sup>(4)</sup>

Pigmentary skin lesions are a diagnostic challenge and cause significant frustration to both patient and treating clinician.

- The predominant age group affected was 31-40 years in this study, which differed from the study of Deepadarshan K et al<sup>(6)</sup>, and Soni et al<sup>(7)</sup> that showed 21-30 years as the most common age group involved 27.
- The mean age was 37.5 years in this study, which was similar to soni et al<sup>(7)</sup> and Shrestha et al<sup>(8)</sup> that showed 32.64 and 38.14 respectively.

**Table III:-** Comparison of relative incidence of in various pigmentary skin lesions with other studies.

| Sr.no | Lesions                               | Rajesh Singh et al 2013 <sup>(9)</sup> | Suvrnaker et al 2014 <sup>(16)</sup> | Abhishek singh et al 2020 <sup>(11)</sup> | Present Study    |
|-------|---------------------------------------|--|--------------------------------------|---|------------------|
|       |                                       | No. of cases (%)                       | No. of cases (%)                     | No. of cases (%)                          | No. of cases (%) |
| 1     | Nevus                                 | 136(74.4%)                             | 12(27.27%)                           | 13(20%)                                   | 23(29.11%)       |
| 2     | Lichen planus pigmentosus             | 03 (1.6%)                              | -                                    | 08 (12.3%)                                | 14 (17.72%)      |
| 3     | Basal cell Carcinoma (pigmented type) | 07 (3.9%)                              | 12 (27.25%)                          | 07 (10.7%)                                | 06 (7.59%)       |
| 4     | Malignant melanoma                    | 18(9.8%)                               | 05(11.36%)                           | 10(15.3%)                                 | 02(2.53%)        |
| 5     | Lichen simplex chronicus              | 03(1.6%)                               | -                                    | -   | 02 (2.53%)       |
| 6     | Seborrheic keratosis Pigmented type   | 11 (6%)                                | 10 (22.72%)                          | 11 (16.9%)                                | 08 (10.12%)      |
| 7     | Solar lentigo                         | 04 (2.2%)                              | 03 (6.82%)                           | -   | 01(1.26%)        |
| 8     | Dysplastic nevi                       | -                                      | 02(4.15%)                            | -   | 00               |
| 9     | Dermatofibrosarcoma protuberans       | -                                      | -                                    | 03(4.6%)                                  | 02(2.53%)        |
| 10    | Keratoacanthoma                       | -                                      | -                                    | 01(1.5%)                                  | 03(3.79%)        |
| 11    | Post inflammatory hyperpigmentation   | -                                      | -                                    | 05(7.69%)                                 | 06(7.59%)        |
| 12    | Cavernous Hemangioma                  | -                                      | -                                    | 03(4.61)                                  | 09(11.39%)       |
| 13    | Lobular capillary hemangioma          | -                                      | -                                    | 04(6.15%)                                 | 03(3.79%)        |
| 14    | Angiokeratoma                         | -                                      | -                                    | 01(1.53%)                                 | 00               |
|       | <b>Total</b>                          | 183 (100%)                             | 44(100%)                             | 65(100%)                                  | 79(100%)         |

- **Melanocytic nevi** in present study was 29.11% which is comparable to Suvrnaker et al study<sup>(10)</sup> and Abhishek singh et al 2020<sup>(11)</sup> which shows 27.27% and 20% of cases respectively.
- Rajesh singh et al<sup>(9)</sup> shows 74.4% due to geographic variation as their study was done in manipur, easternmost part of india and the present study is done in Ahmedabad, gujarat, western most state of india.
- Hansen's disease was the most common histopathological diagnosis reported in our study showing 52.5 % which is comparable to Yalla ASD et al study<sup>(12)</sup> which showed 33.34% leprosy cases .
- In the present study, leprosy was most commonly seen at 31 to 40 years (30.87%) which is comparable to Kaur I et al(2003) study<sup>(13)</sup> which showed 30.8% in 31 to 40 years.
- In present study, leprosy was most commonly seen in male(59.06%) which is comparable to National Leprosy control Programme(2004)<sup>(14)</sup>,S. Srismitha et al 2019<sup>(15)</sup>and Soni et al 2019<sup>(7)</sup>in which male were 61.3%,70% and 60.9% respectively.

### Conclusion:-

- it is to be remembered that most of the pigmented skin lesions are benign, encountered in the 3rd decade of life, and commonly affect the head and neck.
- Out of the 284 cases included in the study, 151 were male and 133 were female.
- Patch forms the most common type of lesion among the 284 pigmentary lesions.
- Histopathological examination of clinically pigmentary skin lesions differentiates between melanocytic and non melanocytic lesions and also identifies malignant tumors.
- Since early detection and treatment of lesions are crucial to decrease functional and cosmetic morbidity and costs, histopathological examination of Pigmentary skin lesions is essential.
- Hence, a systematic approach of clinical and histopathological examination provides an accurate diagnosis of pigmentary disorders and thereby reducing the patient distress.

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